ION EXCHANGE RESINS

- Boiler feed water
- Drinking water: removal of contaminants
- Radioactive waste cleaning
- Ultra-pure water for semiconductors
- Waste treatment: recovery of metals
- Food and beverage processing
- Pharmaceuticals
Resins

- **Uniform particle size**
  - Amberjet™

- **Standard particle size**
  - Amberlite™

- **Various polymers**
  - Styrenic
  - Acrylic
  - Phenolic

- **Different matrices**
  - Gel type
  - Macroporous
## Applications

### Water treatment
- Industrial water treatment
- Boiler feed water
- Nuclear power
- Condensate
- Radioactive waste
- Ultra-pure water
- Drinking water
- Household softening
- Waste water

### Special applications
- Catalysts
- Separations
- Purifications
- Nutrition
- Pharmacy
- Biotechnologies
Industrial water treatment

- Softening
- Demineralisation
- Mixed bed polishing

ADI standard plant
Demineralisation

- Boiler feed water with
  - Amberjet resins
- Quality
  - 0.1 to 1 µS/cm before polishing
  - 0.055 to 0.1 µS/cm after polishing
Amberpack™

- Reverse flow regeneration technology
  - Compact system
  - Easy regeneration
  - Very little waste
  - 98% water recovery
  - 99.95% salt rejection
  - Hundreds of plants in service
Advanced Amberpack™

- With fractal distribution
  - ADI 60: 60 m³/h demineralisation
  - ADN for nitrate removal
  - Compact and modular

ADI 60
Polishing

- After RO
- After primary demin
- After flash evaporation
- Condensate polishing
- Mixed bed technology
  - Amberjet resins
- Amberpack Sandwich™
  - No mixing, no backwash
● Mixed bed for electro-erosion machines
  - Special resin for this application only
  - Ready for use
  - Amberlite MB9L
Power

Nuclear and fossil-fuelled stations (EdF etc.)

- Boiler make-up water
- Condensate polishing
- Primary circuit
- Secondary circuit
- Radioactive waste treatment
- Fuel storage pond
Condensate polishing

- Unique resin combination: Amberjet 1500 + Ambersep 900
  - Stable
  - Clean
  - High ammonia capacity
  - Excellent separability
Household softening

Large and small producers of softeners use

- Amberlite SR1LNa
- Imac™ HP1110Na

Approved by French Health Authority and many other authorities

In Europe, all dishwashers are equipped with a small softener using a resin like

- Amberlite IR120FF Na
Drinking water

• Point of use
  A growing market with
  Imac HP333
    Hardness removal cartridges
  Imac HP555
    Selective nitrate removal
Drinking water

• Municipal
  Amberlite PWA5
  Nitrate removal
  Amberlite PWA10
  Boron removal
  Amberlite PWA2
  Perchlorate removal

Advanced Amberpack™

ADN in the UK
Boron removal after RO

- Amberlite PWA10
- Totally selective resin
- Removes B only
- 0.1 mg/L residual B
- 99% + water recovery

Boron removal in Kziot
Ultra-pure water

Amberjet UP and Amberlite UP developed specifically for the semiconductor industry

Minor impurities in the water used for the production of wafers can create short-circuits and make the product unusable.

Amberjet UP6040 used in the final mixed bed polisher

It brings the last impurities down to ng/L (ppt) levels.
Waste water solutions

- **Soil reclamation**
  - Heavy metals removal (Hg, Cd)
    - Ambersep GT74
    - Amberlite IRC748
  - Removal of phenol
    - Amberlite XAD4

- **Ammonium nitrate recovery**
  - Fertilizer plants
Catalysis using ion exchange resins

**Amberlyst 31, 131 & 121**
main catalysts used for Bisphenol A, one of the components of polycarbonate and epoxy resins.

**Amberlyst 15Dry & 36Dry**
For the production of alkylphenols used in detergent formulations

**Amberlyst 35**
catalyst used in the synthesis of octane improvers (petrol additives) such as MTBE, ETBE, TAME & iso-octane
Chemical separations

● Uranium mining
  ● Amberjet™ 4400 & Ambersep™ 920U

● Soil reclamation
  ● Heavy metals removal (Hg, Cd)
    ▪ Ambersep GT74
    ▪ Amberlite IRC748
  ● Removal of phenol
    ▪ Amberlite XAD4

● Ammonium nitrate recovery
  ● Fertilizer plants

● Purifications
  ● Phenol
  ● Glycol
  ● Formaldehyde
Chemical separations (2)

- **Boron removal**
  - From magnesium brine
    - Amberlite IRA743

- **Calcium removal from brine**
  - Chlor-alkali industry
    - Amberlite IRC747

- **Biodiesel purification**
  - Removal of potassium and sodium
    - Amberlite BD10Dry
Many applications

- Rinse water from plating baths
- Recovery of metal catalysts
- Chromic acid recycling
- Pickling baths recycling
- Removal of iron from chromic acid
- Metal catalyst recovery in plastics production
- Recovery of gold from plating solutions
- Recovery of silver
Sugar & sweeteners

- Calcium removal from beet juice
  - Amberlite FPC14 Na

- De-ashing of liquid sugar
  - Amberlite FPC22 H and FPA53

- Colour removal from cane juice
  - Amberlite FPA98 Cl and FPA90 Cl

- Purification of sweeteners
  - Glucose, fructose, maltose
  - Polyols

- Chromatographic separations
  - Amberlite CR1310 & CR1320
    - High fructose syrup
Beverages

- Orange juice debittering
  - Amberlite FPX66

- Water for breweries
  - De-alkalisation, partial deionisation
    - Amberlite PWC13

- Water for soft drinks
  - Removal of colour and natural organics
    - Amberlite PWA9
Pharmaceutical applications

- **Resins as active ingredients**
  - Duolite AP143 = cholestyramine
    - Blood cholesterol control
  - Amberlite IRP69 = sodium polystyrene sulphonate
    - Reduces blood potassium level

- **Resins as drug excipients**
  - ART (advanced release technologies)
    - A series of technologies and products
      - Tablet disintegrants
      - Taste-masking
      - Slow release
  - Amberlite IRP64
    - Taste masking
    - Controlled release of drugs
    - Nicotine loaded chewing gums
Biotechnologies

- **Amberlite Cobalamion**
  - Purification of Vitamin B 12 from fermentation broths

- **Amberlite XAD1600**
  - Non-ionic adsorbent
  - Separation of two or more similar species
  - Production & purification of antibiotics

- **Amberzyme™ Oxirane**
  - Enzyme immobilisation

- **Amberchrom™ CG & XT**
  - Adsorption
  - Reversed phase liquid chromatography
  - Purification of proteins and peptides